REMARKS

Claims 31 and 32 have been amended to address the objection under 37 C.F.R. §1.75(c) and the rejection under 35 U.S.C. §112, second paragraph, and claims 27-29 have been canceled. Claims 18 and 33 have been amended to clarify that the objective function is a function of the monitored response performances following decisions and actions taken by the system. Claims 19-26, 30, and 34 have not been amended. Claim 28 has been rewritten as new claim 35. Upon entry of this amendment, claims 18-26 and 30-35 will be in the application.

No new matter has been added by the proposed amendments. Also, no new issues have been raised as the amendments to claims 31 and 32 relate to bodily incorporating the subject matter of claim 18 into these formerly dependent claims. Also, new claim 35 raises no new issues as it corresponds to the subject matter of claim 28 except that it has been rewritten for clarity and to bodily incorporate the subject matter of claim 18. Entry of the proposed amendments after Final Rejection is requested.

Objection to Claims 31-32

The Examiner objected to claims 31 and 32 as allegedly being of improper dependent form for allegedly failing to limit claim 18 from which they depend. Claim 31 has been amended into independent form to incorporate the subject matter of claim 18 as suggested by the Examiner. Claim 32 has been amended to specify that the system of claim 31 may be a robot and the control apparatus controls the objective function of the robot so as to optimize the objective function of the robot. Withdrawal of the objection to claims 31 and 32 is requested.

Rejection Under 35 U.S.C. §112, 2nd Paragraph

Claims 27-29 and 31-32 stand rejected under 35 U.S.C. 112, second paragraph, as allegedly being indefinite. Claims 27-29 have been canceled, thereby obviating this rejection with respect to those claims. Claims 31 and 32 have been amended to overcome this indefiniteness rejection.

The Examiner finds claim 31 unclear as to whether the system in the language "a system having a control apparatus" is the same system as that recited in claim 18 or not.

Claim 31 has been amended to incorporate the limitations of independent claim 18 to clarify that only one system is being optimized in the claimed manner.

The Examiner rejected claim 32 as indefinite as to how the robot specifically affects the elements of claims 18 and/or 31. Claim 32 has been amended to recite that the system of claim 31 is a robot and that the control apparatus controls the objective function of the robot. The relationship of the subject matter of claim 32 to the subject matter of claim 31 is now believed to be clear. Claim 32 is thus believed to be definite as amended.

Claim 28 has been rewritten as new claim 35 for purposes of clarification. Claim 35 specifies that the system contains "subsystems" and that a candidate action of the system corresponds to the selection of a given subsystem and that the candidate actions are controlled in a fashion to optimize the performance of the entire system. Support for this language may be found, for example, in paragraphs [0135]-[0158] with respect to Figures 10-12 of the specification. Claim 35 also incorporates the language of claim 18 so as to specify how each subsystem is controlled. Claim 35 is thus believed to overcome the Examiner's indefiniteness concerns with respect to claim 28. Further examination of claim 35 is requested.

The amendments to claims 31 and 32 are believed to overcome the Examiner's indefiniteness concerns with respect to claims 31 and 32, and new claim 35 is believed to overcome the Examiner's indefiniteness concerns with respect to claim 28. If the Examiner still has concerns about the definiteness of the claim language, she is encouraged to contact Applicant's undersigned representative to discuss claim changes to remove any such ambiguities. Withdrawal of the rejections of claims 27-29 and 31-32 under 35 U.S.C. 112, second paragraph, is solicited.

Rejections Under 35 U.S.C. §103

In the Official Action, claims 18-21, 24-25, 30-31, and 33-34 were finally rejected under 35 U.S.C. §103(a) as allegedly being obvious over Merriman et al. (US 2002/0099600) in view of Eppen et al. ("Quantitative Concepts for Management"). In addition, claims 22 and 26 were finally rejected under 35 U.S.C. §103(a) as allegedly being obvious over Merriman et al. and Eppen et al. further in view of McClave et al. ("A First Course in Business Statistics"); claim 23 was finally rejected under 35 U.S.C. §103(a) as allegedly being obvious over Merriman et al. and Eppen et al. further in view of Jameson (US

6,032,123); and claims 27 and 32 were finally rejected under 35 U.S.C. §103(a) as allegedly being obvious over Merriman et al. and Eppen et al. further in view of Strickland et al. (US 5,790,407). These rejections are believed to be improper and are respectfully traversed.

As noted by the Examiner, Merriman et al. disclose a system and method of controlling a system to optimize an objective function by selecting a candidate action, monitoring the system performance in response to the selected candidate action, storing a representation of the monitored response performance, choosing the next candidate action to optimize the objective function, and repeating the process. Thus, the Merriman et al. system makes decisions, stores the results and attempts to make improved decisions based on historical observations in a manner consistent with the prior art systems noted in the background portion of the specification. The Merriman et al. system thus has the same limitations as prior art "learning" systems discussed in the background portion of the specification. Moreover, as specifically acknowledged by the Examiner (page 17, lines 3-9, of the Final Rejection), Merriman et al. do not teach that the objective function is optimized by assessing the probability distributions of all the candidate actions in order to control the growth of regret, "where regret is a term that represents a system performance measure that considers the relative merit of exploration of one or more apparently non-best candidate actions with respect to the merit of exploring what appears to be the current best candidate action." For such a teaching of "regret," the Examiner refers to Eppen et al. However, as will be explained in detail below, the teachings of Eppen et al. do not control the growth of regret in the manner claimed either. Accordingly, the obviousness rejection must fail for lack of *prima facie* obviousness.

Eppen et al describe their "Decision Framework" in connection with Figure 14.1 at page 503, second paragraph as follows:

"In decision theory problems, the fundamental piece of data is a payoff table like Figure 14.1. In this figure alternative decisions are listed along the side of the table and the possible states of nature are listed across the top. The entries in the body of the table are the payoffs for all possible combinations of decisions and states of nature.

The decision process proceeds as follows:

1. You, the decision maker, select one of the alternative decisions d1,….dn. Suppose that you select d1.

2. After your decision is made, a state of nature occurs. Suppose state 2 occurs.

3. The return you receive can now be determined from the payoff table."

Eppen et al. thus teach processes (methods of controlling a system) to optimize objective functions (such as Minimax, Maximax, Maximin and Minimax Regret), where the objective function is a function of pay off performances. A single pay off performance is considered to arise when a particular decision interacts with a particular state of nature (scenario conditions). In the processes taught, Eppen et al. assume that given a particular decision and given a particular state of nature, that the pay off is a known quantity. These pay offs are stored in a predefined pay off table, such as in Figure 14.1. Importantly, these pay off values are not considered to be estimates based upon previous observations, and therefore the benefit of taking specific decisions to generate more exemplars and to improve the confidence in those estimated pay offs is not considered.

The decision process of Eppen et al. contrasts with the claimed system where appraisals of estimated pay offs are dependent upon previous monitored response outcomes (given a particular decision and particular state of nature). This dependence on previous response outcomes is expressed directly in the claim language. For example, independent claim 18 recites:

- A system capable of making decisions ("…the system being capable of performing a plurality of candidate actions…");
- For which following a decision there is a response performance which is measurable ("…and being capable of monitoring response performances of a performance of a respective candidate action…");
- Where that decision and response performance data is then stored, and where the stored decision and response performance data are therefore directly dependent upon the decisions taken, and where that stored data is used as the basis for appraisal of new decision scenarios ("storing according to the candidate action performed, a representation of said monitored response performance; …choosing which of a plurality of candidate actions is next performed so as to optimize said objective function by assessing, using the probability distribution of the response performances of all said plurality of candidate actions…").

In other words, the claimed system appraises the pay offs expected to arise from new decisions on the basis of historically observed pay offs, and where there exists uncertainties

in the estimates of these pay offs that are directly affected by the number of historical observations available upon which to base these pay off estimates. Eppen et al. do not handle such uncertainties in pay offs; on the contrary, as noted above, a predefined payoff table is provided.

This difference is fundamental, as in the claimed system the decision process must consider the relative merit of further *exploration* of one or more ***apparently*** non-best candidate actions with respect to the relative merit of *exploiting* what ***appears to be*** the current best candidate action based on the finite set of historical response performances to date. The system must do this to manage the risk of being misled by estimated pay off outcomes which are based on few observations. The claimed system is therefore one in which the decision process requires the explicit control of "a system performance measure that considers the relative merit of exploration of one or more apparently non-best candidate actions, with respect to the relative merit of exploiting what appears to be the current best candidate action based on historical response performances to date" (claim 18). This requirement for balancing the exploration of apparent non-best performing decisions (actions) with the exploitation of the apparent best decisions (actions) is the central complexity and core subject matter of the claimed system. Eppen et al. always know with certainty the best candidate action for the given state of nature (because all the payoffs are known for each combination of decision and state of nature) and hence do not teach the minimization of the growth of regret under the condition where the true best candidate action is not known. Eppen et al. do not teach, and have no reason, to consider the relative merits of "exploration of one or more apparently non-best candidate actions, with respect to the relative merit of exploiting what appears to be the current best candidate action based on historical response performances to date" as claimed. Eppen et al. do not have to consider how to handle uncertainties in the payoff values of the payoff table, as they are considered to be known.

As set forth in M.P.E.P. §§2142-2143.03, in order to establish a prima facie case of obviousness, patent examiners are required to establish three criteria: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; (2) there must be a reasonable expectation of success; and (3) the prior art reference, or combination of references, must teach or suggest all the claim limitations. The

examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. To make a proper obviousness determination, the examiner must "step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made." In view of the available factual information, the examiner must make a determination as to whether the claimed invention "as a whole" would have been obvious at that time to a person of ordinary skill in the art. Importantly, a rejection based on these criteria must be based on what is taught in the prior art, not the applicant's disclosure. The applicant's disclosure may not be used as a blueprint from which to construct an obviousness rejection.

In view of the fact that Merriman et al. and Eppen et al. taken together do not teach the claimed minimization in the growth of "regret," and hence do not teach all of the claimed features of the invention, even if the teachings of Merriman et al. could be combined with the teachings of Eppen et al. as the Examiner suggests, the invention of independent claim 18 would not result. In particular, while the proposed combination could have taught one skilled in the art to minimize the growth of "regret" as taught by Eppen et al. based on known relationships stored in a payoff table, the proposed combination would *not* teach minimizing the growth of "regret" as claimed since the cited references do not teach or suggest "exploration" of "non-best candidate actions" as claimed in order to optimize the system performance even when the "payoff" of a prospective candidate action is unknown (unlike Eppen et al. where the payoff is known). The Examiner has thus failed to establish *prima facie* obviousness and the rejection of claims 18 and 33 and all claims dependent thereon should be withdrawn. Similar features may also be found in independent claims 31 and 35; therefore, these claims are allowable for the same reasons.

Moreover, the Examiner has further failed to provide a *prima facie* case of obviousness with respect to any claim since the Examiner has not met her burden of providing a suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings. Instead, the Examiner has mistakenly stated that "it would have been obvious to one of ordinary skill in the art at the time of the invention to use probability distributions and the theory of regret in the iterative predictive model of Merriman et al. in order to increase the efficiency of utilizing advertising/action space by providing a decision framework with

which to analyze the various options." The general citations provided by the Examiner do not provide the requisite teachings, suggestions or motivations to combine the teachings of Merriman et al. and Eppen et al. in the manner contemplated by the Examiner. In any case, as noted above, the proposed combination clearly does not suggest the claimed system and method for minimizing the growth of regret in controlling a system. As a result, one skilled in the art would not be motivated to combine the teachings of Merriman et al. and Eppen et al. to provide a system and method for minimizing the growth of regret as claimed.

In view of the above, if the Examiner elects to maintain the obviousness rejections of independent claims 18 and 33, the Examiner is again strongly urged to clearly articulate the evidence of suggestions, motivations, or knowledge possessed by those skilled in the art that would have led one skilled in the art to combine the teachings of the cited references to arrive at the claimed invention. In the absence of the requisite teachings and motivations to combine teachings to establish *prima facie* obviousness, the rejections of claims 18-34 as being obvious over Merriman et al. and Eppen et al. or any other cited prior art reference is improper and withdrawal of the obviousness rejections is respectfully solicited.

Conclusion:

For the above reasons, entry of the above amendment is appropriate after Final Rejection to place the present application in condition for allowance without introducing any new issues for the Examiner's consideration. A Notice of Allowability is respectfully solicited.

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